EPA Contract No. 68-W6-0042
EPA Work Assignment No. 122-RICO-01N9

EPA Project Officer: Diana King
EPA Remedial Project Manager: Leslie McVickar

Final Remedial Investigation

Volume I

Pownal Tannery Superfund Site
Pownal, Vermont

July 2002

Prepared By

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Team Subcontractor
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Lowell, Massachusetts 01852

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E EXECUTIVE SUMMARY

Metcalf & Eddy of Wakefield, Massachusetts (M&E) received Work Assignment (WA) No. 045-RICO-01N9 under the EPA Response Action Contract No. 68-W6-0042 (RAC) to complete a Remedial Investigation/Feasibility Study (RI/FS) at the Pownal Tannery Superfund (Site) in North Pownal, Vermont. M&E assigned the primary responsibility for completing most of the Remedial Investigation to TRC Environmental Corporation of Lowell, Massachusetts (TRC).

This report presents all of the data collected during the Pownal Tannery Remedial Investigation. This report also presents a scientific interpretation of the facts to provide a basis for further work, including a Feasibility Study to evaluate potential remedial alternatives.

E.1 Areas Studied

The study area for this Remedial Investigation encompasses all of the properties that are known or suspected to have been associated with contaminant releases from industrial activities at the former Pownal Tannery.

The following six areas of concern were studied.

1. Former Tannery Building Area
2. Lagoon Area
3. Warehouse Area
4. Landfill Area
5. Hoosic River
6. Woods Road Waste Disposal Area

E.2 Sampling Activities

Separate sampling activities took place in areas remote from the site for the purposes of evaluating background and "reference" conditions. A separate examination of off-site residential wells was also conducted to evaluate the ground water quality of private drinking water supply wells.

Two phases of investigation were conducted at the site during the period from March through December 2000. The first phase included advancement of soil borings, installation of ground water monitoring wells, sampling and laboratory testing of soil, ground water, surface water and sediment, and ecological survey activities. Based on the findings of the first phase, a second phase of investigation was planned to delineate findings of the first phase. The second phase included construction of additional soil borings and ground water monitoring wells, installation of piezometers, excavation of test pits, and sampling of soil, ground water and floor drains.

A total of 11 overburden ground water monitoring wells, four bedrock ground water monitoring wells, and eight piezometers were constructed during this Remedial Investigation. Five ground water sampling events were conducted (March 2000, May 2000, August 2000, October 2000, December 2000), including two sampling rounds of ten nearby residential wells.

E.2.1 Landfill Area

Throughout the field activity associated with this Remedial Investigation, the USACE and EPA were completing closure of the landfill as part of the Non-Time Critical Removal Action (NTCRA). Consequently, the only recognized source of contamination in this area (the Landfill) was fully addressed and no further remedial investigative work was needed to characterize the contaminant source area.

However, the NTCRA did not address any potential ground water contamination issues, or concerns of possible impacts from landfill seeps or ground water discharge to the wetlands, streams and the Hoosic River located downhill and downgradient from the site. Therefore, the focus of the Landfill Area investigation was on ground water quality and potential sediment and surface water impacts.

E.2.2 Lagoon Area

The focus of the Lagoon Area Investigation was to evaluate the extent, thickness, and chemical composition of the lagoon contents. Previous environmental investigations in this area indicated the presence of elevated chemical concentrations in the sludge and soils in the lagoons but no significant ground water contamination was ever reported. Nevertheless, a ground water investigation was included to determine if there were any ground water impacts.

Four of the five lagoons (1, 2, 4 and 5) have some standing water throughout the year, so surface water and sediment samples were obtained from the lagoons to evaluate human health and ecological risk. Surface water and sediment samples were also collected from the adjacent reach of the Hoosic River.

E.2.3 Former Tannery Building Area

Prior to the beginning of the Remedial Investigation, the Tannery Building was decontaminated and demolished by the USACE. In addition, a large volume of soil was excavated from inside the building footprint, all known underground piping was removed, and several underground manways were filled and closed. Portions of the original building foundations remain underground in some places, and the entire site was regraded and finished with grass, crushed rock and stone. As a result of the USACE actions taken on this portion of the site, the focus of the subsequent Remedial Investigation was on the ground water quality, and the potential impacts of the site on the adjacent Hoosic River sediment and surface water.

The only known potential source of ground water contamination in the Former Tannery Building Area is an underground solvent tank that was discovered by the USACE during the NTCRA. The underground solvent storage tank and some soil were removed by the USACE in October 2000. The tank was constructed of steel and had numerous holes when it was removed. The USACE observed evidence of a release in the rock and soil that were present beneath the former tank. The USACE also reported an area of oil stained soil with a “diesel” odor in the area between the Hoosic River and the location of the underground solvent storage tank. Additional

testing in this area was performed during the RI to evaluate potential ground water impacts.

E.2.4 Warehouse Area

The planned focus of the Warehouse Area investigation was on the area adjacent to the eastern side of the building where hides were reportedly stored and stacked. TRC initially programmed a surface soil sampling program in this area to evaluate potential soil contamination. However, based on Phase I findings, additional Phase II sampling was added to the Remedial Investigation to evaluate subsurface soil contamination in the area.

In addition, at the beginning of the Remedial Investigation, the warehouse building was over 75 percent full of wood chips making it impossible to inspect the floor for possible drains or other potential release points and pathways for contaminant migration. However, at the conclusion of Phase I field activities, the warehouse was empty, and TRC observed several manholes and pits that were filled with soil, sludge, and wood chips. TRC also noted overpacked drums in the warehouse and an accumulation of potentially asbestos containing materials. Concurrent with development of a plan to sample these manholes and pits, the USACE and EPA decided to undertake decontamination and closure of the pits and drains, and removal of the drums and potential asbestos containing materials as part of the NTCRA.

TRC obtained only one sample from one floor drains in the warehouse, initially to assist the USACE and EPA in characterizing the material for disposal. Further sampling was completed by the USACE and EPA as part of the NTCRA.

TRC also advanced several soil borings through the floor of the warehouse to evaluate potential subsurface soil contamination.

E.2.5 Woods Road Waste Disposal Area

The Woods Road Waste Disposal Area was not originally recognized as a separate disposal area during the planning stages of the Remedial Investigation. One surface soil sample (SS-14) was originally proposed in this area to be used as a “background” sample, and a well was proposed to allow a limited investigation of the character of the material in the subsurface, since this area is on tannery property. However, during site reconnaissance, evidence of tannery waste was identified in the western Hoosic River bank, north of the bridge and TRC expanded the investigative program in Phase II to include test pit excavation.

After TRC excavated the test pits in this area and received the laboratory results, the USACE and EPA decided to remove the waste materials from the site as part of the NTCRA. Most of the samples collected by TRC in this area represent samples from material that is no longer present at the site.

E.3 Physical Characteristics of the Study Area

E.3.1 Regional Charcteristics

The former Pownal Tannery site is situated on the Hoosic River, an upper tributary of the Hudson River, between the Green and Taconic Mountain Sections of the New England Province (Fenneman 1938). The site, located on the narrow lowlands of the Vermont Valley physiographic zone, has twice been covered by glacial lakes of the Pleistocene epoch. At the maximum depths of glacial Lakes Bascom and Lake Shaftsbury the valley was covered to more than 1,000 feet above mean sea level.

The topography of the region reflects the structure and lithology of the underlying bedrock. The major landform features within the Hoosic Valley are low-gradient fluvial terraces associated with Pleistocene glaciation and modern floodplain sediment developed on an eroded valley fill of glacial lake sediment.

The Hoosic River represents a Class B Water as defined by the Vermont Water Resources Board (1997). Class B waters have an objective of providing water quality that consistently exhibits good aesthetic value and provide high quality habitat for aquatic biota, fish and wildlife. Uses of Class B waters include public water supply (with filtration and disinfection); irrigation and other agricultural uses; swimming and recreation. The Hoosic River is also classified as a Cold Water Fish Habitat (i.e., suitable for coldwater fishes such as trout).

The site is primarily underlain by Holocene river floodplain and tributary alluvium, comprised of sand and gravel. This alluvium surrounds the approximate current course of the Hoosic River. To the northeast of these deposits is a wide area of Holocene fluvial terrace deposits, also consisting of sand with gravel. Bedrock outcrops surround the area of the former Tannery buildings, and elongated areas of fill are mapped along the railway line to the east of the Hoosic River, to the north and south of the site.

The site is primarily underlain by bedrock associated with the Taconic Range, specifically the Cambrian St. Catherine formation. This formation consists of purple, gray-green, and variegated slate and phyllite containing minor interbeds of white to green quartzite, locally albitic.

E.3.2 Local Characteristics

Based on observations during the installation of monitoring wells and the advancement of borings at the site, TRC identified several stratigraphic units, described below.

- ***Fill:*** An upper layer of miscellaneous fill is present on the surface across much of the site.

- ***Sand and Gravel:*** A sand and gravel layer was observed beneath the entire site, at depths up to approximately 24 feet. This stratigraphic unit generally consists of medium dense to very dense, light to dark brown, fine to coarse sand and gravel.

- ***Fine Silty Sand:*** Layers of Fine Silty Sand were observed underlying the Sand and Gravel in some, but not all of the borings advanced at the site (MW-101U, MW-102U, MW-103R, MW-104U, MW-106U, MW-107R, MW-109U, and MW-111U). This material generally consisted of medium dense, light brown, fine silty sand. At three of the boring locations where this material was observed (MW-106U, MW-109U, and MW-111U), the lower portion of this overburden layer also included fine to medium gravel. The thickness of this material varied at each location, from approximately 8 to 32 feet.

- ***Silt and Clay:*** At three locations at the site (MW-102U, MW-106U, and MW-112U), Silt and Clay was observed underlying the alluvial Sand and Gravel or the Fine Silty Sand. While appearing as a distinct unit, this material may represent a gradual transition from the overlying Fine Silty Sand and the underlying Gray Clay. The thickness of this material ranges up to 20 feet, and is generally comprised of medium dense, light brown to gray silt and clay.

- ***Gray Clay:*** This layer is present beneath the entire site except where bedrock is exposed at the surface, and in areas where the bedrock is very shallow (<10 feet). Two areas where the Gray Clay may be thin or absent include limited areas in the former building area and the west side of the Hoosic River across from Lagoon 4. The Gray Clay unit is thickest near the landfill, reaching thicknesses of over 120 feet.

  This layer is relatively homogeneous and generally consists of medium-stiff, light gray, highly cohesive clay, with an occasional presence of very thin (<1/8-inch) lenses of fine silty sand. The upper surface of this layer varied in depths below grade from 17 to 79 feet, and extended to depths ranging from 57 to 151 feet.

- ***Basal Silty Sand:*** As observed at three of the boring locations (MW-102U, MW-103R, and MW-107U/MW-107R), in some areas of the site, the Gray Clay is underlain by a layer of more granular material. This material consists of medium to very dense, dark gray, fine sand with some silt and clay. The thickness of this unit at the three locations where it was observed ranged from 6 to 28 feet.

- ***Bedrock:*** The bedrock encountered at the site is a fissile, gray green to silver and/or purple phyllite with interbeds of white to green quartzite. The upper 20 to 40 feet of the bedrock is highly weathered and rock cores could not be retrieved from this interval.

Hydrogeology: Ground water flow in the area is predominantly influenced by the Hoosic River. Generally, overburden ground water appears to flow toward and discharge to the Hoosic River.

Plant Community: The project area falls within the Hemlock-White Pine Northern Hardwoods Region of the Eastern North American Deciduous Forest that stretches from Minnesota to the Atlantic Coast. The region is covered in a mixed community of deciduous and coniferous forest the hillsides in contrast to the more open lowlands. Floral species include hemlock, white pine, sugar maple, beech and yellow birch.

Animal Community: Faunal species include eastern cotton-tailed rabbit, white tailed deer, moose, black bear, eastern gray squirrels, woodchuck, and various songbirds. Anadromous fish species, such as salmon and herring are not found in the Hoosic River due to impassable falls at the mouth of the river

Wetlands: Seven wetland areas were identified on the Pownal Tannery site.

- Lagoon 1 Wetland (Palustrine Emergent)
- Lagoon 2 Wetland (Palustrine Emergent/ Palustrine Scrub-Shrub)
- Lagoon 4 Wetland (Palustrine Emergent/Palustrine Scrub Shrub)
- Lagoon 5 Wetland (Palustrine Emergent/Open Water)
- Former Landfill Wetland
- Hoosic River Fringe Wetlands (Palustrine Forested/Scrub-Shrub/Emergent)
- Hoosic River Floodplain Wetlands (Palustrine Emergent/Forested/Open Water)

E.4 Nature and Extent of Contamination

E.4.1 Landfill Area

- No Semi-Volatile Organic Compounds (SVOCs), pesticides, hexavalent chromium, PCBs or dioxins were observed in ground water at concentrations above the detection limit or the MCL.

- Several metals were detected in ground water, all at concentrations below their respective MCLs.

- There does not appear to be a Volatile Organic Compound (VOC) ground water plume in the Landfill Area. The minor VOC occurrence may be from the landfill, but since contamination was not detected consistently, it is unlikely that the landfill (which is now capped) is an ongoing source of VOC contamination.

- The highest metals concentrations were detected in the surface water of landfill seeps and in the pond below the wetland. The metals that were observed at elevated concentrations included aluminum, calcium, iron, magnesium and sodium. The more toxic metals are not present at elevated concentrations. Low concentrations of metals were detected in the landfill streams.

- Elevated concentrations of three VOCs, seven SVOCs , six metals, cyanide, one pesticide, and PCBs are present in the sediments located in the pond below the landfill.

- Sediment samples from the landfills streams contained two Poly Aromatic Hydrocarbons (PAHs) and copper at slightly elevated concentrations.

- Elevated concentrations of seven metals, cyanide, one pesticide, PCB are present in the wetland sediments.

- Elevated chromium, copper and nickel concentrations were observed in sediment samples associated with the landfill seeps.

E.4.2 Lagoon Area

The most extensive sampling effort occurred in the Lagoon Area, where over 140 soil samples were obtained during Phase I and II, and over 800 separate analyses were performed. Samples were collected from surficial soils and subsurface soils, including numerous samples to characterize the nature of contamination in the sludge.

Lagoon Sludge: TRC documented the presence of Lagoon sludge in Lagoons 1, 3, and 5, as well as in a limited area of Lagoon 4. The thickness of this material varied from location to location, with the thickest deposits being 4 to 9 feet in Lagoon 1, and up to 11 feet in Lagoon 3. Deposits of sludge in Lagoon 5 were less than 4 feet in thickness. The majority of sludge appeared to have been removed from Lagoon 2. Except for the southern end of Lagoon 4 (adjacent to Lagoon 3), there was no sludge in Lagoon 4.

Lagoon 1: Lagoon one contains the thickest accumulation of sludge, but the sludge is generally buried beneath a thin layer of cover material and so the surficial soil samples do generally contain elevated concentrations of site contaminants. Lagoon 1 generally has the highest contaminant concentrations on the entire site.

The sludge present in Lagoon 1 generally consisted of moist organic silt including layers of gray clay and varying quantities of hair and hide fragments. The sludge in Lagoon 1 contains layers of various colors (black, blue, white, red, and gray). The upper surface of this deposit was often coated with thin (<1 inch) layers of dry white powder, which may be lime that was added to the sludge to minimize odor generation.

- Several VOCs were observed in Lagoon 1, but the highest concentrations were detected in the sludge. Total VOC concentrations in the sludge were generally observed to range from 50-200 ppm and in one sample the total VOC concentrations exceed 1 per cent.

- Several SVOCs were detected in Lagoon 1, with the highest concentrations present in the sludge buried below 1-2 feet of cover material.

- Elevated metals concentrations were detected in the buried sludge including chromium at concentrations typically ranging from 10,000-70,000 ppm and Lead from 1,000 to 2,000 ppm.

- PCBs are present surface soil and in the sludge at concentrations ranging up to 400 ppb.

- Pesticides are present in both surface and subsurface soils in lagoon 1, but the concentrations detected in the sludge are approximately one order of magnitude higher than the concentrations detected in the surface soils.

- Dioxin Toxicity Equivalence Quotient (TEQs) exceeded 1 ppb in several samples.

- None of the samples tested for Toxic Characteristic Leachate Procedure (TCLP) exceeded the RCRA Hazardous Waste threshold.

Lagoon 2: Lagoon 2 contains only a very small quantity of sludge, so there is no significant contrast in chemical concentrations versus depth. In general, fewer site contaminants are present in Lagoon, and the chemical concentrations are generally lowest in Lagoon 2. A summary of the laboratory test results is presented below.

- The inorganic constituents are present at concentrations that are closer to background soil conditions. Representative maximum concentrations for some metals detected include arsenic at 5.2 ppm, cadmium at 11.4 ppm, chromium at 2,690 ppm, lead at 192 ppm, nickel at 19.7 ppm and cyanide at 2.5 ppm.

- All dioxin TEQs were less than 1 ppb.

- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Lagoon 3: Lagoon 3 is the smallest of the lagoons. Samples were collected from seven borings. In previous investigations Lagoon 3 was divided into two sub-lagoons, 3A and 3B, though there are no present day landmarks or other features that distinguish the two sub-lagoons. The Lagoon is now covered with gravel fill and is largely unvegetated. A summary of the laboratory test results is presented below.

- Metals are present in the greatest concentration within the sludge layer. Cadmium was not detected in surface soils, nor in the underlying gravel layer, but is present in the sludge at concentrations up to 42 ppm. Chromium and lead are present at concentrations up to two orders of magnitude greater (chromium up to 18,000 ppm, lead up to 565 ppm) than in surface soils or the underlying soil.

- All dioxin TEQs were less than 1 ppb.

- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Lagoon 4: Lagoon 4 is the largest lagoon. Samples were collected from 29 borings.

- The maximum total VOC concentration is less than 200 ppb.

- Eleven SVOCs are present in Lagoon 4..

- The highest metals concentrations in Lagoon 4 are present in the surficial soils. Lead, chromium and cadmium are present at higher concentrations (one to two orders of magnitude greater) in the surface soils than in the subsurface soils.

- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Lagoon 5: Lagoon 5 is mostly underwater throughout the entire year. A summary of the contaminants found in Lagoon 5 is presented below.

- Two SVOCs were detected in Lagoon 5: pentachlorophenol (6,300 ppb at one location) and bis(2-ethylhexyl)phthalate (less than 800 ppb).

- Several metals are present in Lagoon 5, including arsenic (up to 2.1 ppb), chromium (up to 16,100 ppb), lead (up to 624 ppb) and mercury (up to 4.1 ppb).

- None of the samples tested for TCLP exceeded the RCRA Hazardous Waste threshold.

Ponds, Surface Water and Sediment: Aluminum and barium are present in unfiltered surface water samples at concentrations that exceed the National Water Quality Criteria-Chronic levels in the Hoosic River samples. Aluminum, barium and magnesium are present in unfiltered surface water samples from the Lagoon ponds at concentrations that exceed the National Water Quality Criteria-Chronic levels. None of the filtered samples contained metals or cyanide at concentrations above their respective National Water Quality Criteria-Chronic levels.

Six SVOCs are present in Hoosic River sediment samples. Five of these compounds are present at concentrations that exceed their respective Ontario Ministry of the Environment Lowest Effect Level values. No pesticides were observed above their respective detection limits in any of the sediment samples. PCBs were detected in four Hoosic River sediment samples from the Lagoon Area, ranging in concentrations of 86 to 270 ppb. Dioxins were detected in the two Lagoon pond sediment samples (TEQ ranging from 106 to 127 ppt) and in the Lagoon Area Hoosic River sediment samples (TEQ less than 3 ppt).

E.4.3 Former Tannery Building Area

- Elevated concentrations of 12 SVOCs in soils were observed, although the detection limits were elevated.

- Visual evidence of oil staining was observed during drilling, extending vertically down to the shallow bedrock surface at location MW-113.

- There were only two metals detected in ground water at concentrations exceeding their respective MCL. Thallium was detected in MW-111U during the September 2000 sampling round at a concentration of 1.3 ppb (versus the MCL of 1 ppb) and arsenic was detected in MW-113R at a concentration of 58.4 ppb (versus the MCL of 10 ppb).

- Several SVOCs were observed at elevated concentrations.

E.4.4 Warehouse Area

- Pyrene was detected (370 ppb) in the reported hide storage area (SS-01) and both pyrene and fluoranthene were detected (<500 ppb) in surface soil sample SS-02 collected near

the roadway, east of the warehouse.

- Ten PAH compounds are present at concentrations above detection limits in the soil below the warehouse. The maximum total PAH concentration (19,400 ppb) is in boring SBW-09. It appears that the PAHs are associated with the presence of coal and ash in the soils beneath the warehouse.

- Other SVOCs were also detected in some of the soil below the warehouse including pentachlorophenol, naphthalene, 2-methylnaphthalene, and bis(2-ethylhexyl)phthalate.

- No PCBs were observed above detection limits in the Warehouse Area soils.

- The dioxin TEQ for the warehouse soils tested was less than 10 ppt for all samples.

E.4.5 Woods Road Disposal Area

- The Woods Road Disposal Area contained mostly soil mixed with demolition debris and tannery waste. The waste material contained mostly soil mixed with small pieces of leather and hides, thin layers of black hydrocarbon rich soil, pieces of metal, piping, wire, brick, stone, and one crushed (empty) drum. The waste layer ranged in thickness up to six feet.

- The highest soil concentrations of pesticides included 4,4-DDT (1,100 ppb), 4,4-DDE (110 ppb) and 4,4'-DDD (63 ppb).

- Elevated concentrations of metals were detected in the test pit soils. Chromium was present above 500 ppm and lead concentrations exceeding 100 ppm were present. None of the TCLP test results for chromium or lead exceeded the RCRA hazardous waste concentrations. All of the soils containing elevated metal concentrations were excavated by EPA during the NTCRA.

E.4.6 Residential Wells

- Only two VOCs were observed in residential wells above their respective detection limits. Acetone was detected at a low concentration (3 ppb) in RW-009 during the June 2000 resampling of that well. MTBE was detected in RW-006 at a concentration of 4.4 ppb during the August 2000 sampling event.

- No SVOCs, pesticides or PCBs were detected in any residential well above the detection limit.

- Only one well (RW-010) contained a metal (lead) at a concentration (493 ppb) that exceeded the MCL (15 ppb). This exceedance was observed in the May 2000 sampling round. Due to this anomalous result, this well was resampled in June 2000, and lead was not found to be present above the MCL. This finding was confirmed in the August 2000 sampling round where lead was detected at a concentration of only 4 ppb. The May 2000

anomalous lead measurement appeared to be related to the homeowner's well filtration unit.

- No dioxin TEQs were observed above 1 ppt.

E.5 Risk Assessment

Summaries of the human health and ecological risks are presented in the following sections by media and area.

E.5.1 Human Health Risk Assessment

This section provides a summary of the baseline human health risk assessment (Appendix GG). The baseline human health risk assessment provides estimates of risk, under both current use and hypothetical future use scenarios, to both the central tendency (CT) and the reasonably maximum exposed (RME) receptor.

Soil/sludge analytical results were evaluated for the five lagoons and the Warehouse Area. Surface water analytical results were also evaluated for the lagoons. Surface water and sediment analytical results were evaluated for the Hoosic River and associated wetlands. Ground water analytical results from two aquifers (overburden and bedrock) were evaluated in ten off-site private wells and 24 on-site monitoring wells.

For soil/sludge, surface water and sediment, the 95% upper confidence limit (UCL) concentration was used as the exposure point concentration (EPC) unless it exceeded the maximum detected value, in which case, the maximum detected value was used as the EPC. For ground water, the arithmetic mean concentration for each contaminant of potential concern (COPC) in each well was used in calculating the CT exposure, and the maximum concentration for each COPC in each well was used to calculate the RME exposure, rather than using the 95% UCL. If the arithmetic mean concentration exceeded the maximum detected concentration, the maximum detected concentration was used for the CT exposure.

To evaluate current exposures, adolescent (i.e., 7 to 16 years old) trespassers and young child/adult off-site residents were considered as receptor populations. Exposures of trespassers to surface soil/sludge through incidental ingestion of and dermal contact with COPCs were evaluated. Since the lagoon surface waters are shallow, trespassers were assumed to wade, rather than swim. Therefore, only dermal contact with lagoon surface water was evaluated. Exposures of adolescent trespassers to river sediment and surface water were also evaluated. Pathways associated with river surface water and sediment exposures that were evaluated include incidental ingestion of and dermal contact with sediment and surface water. The ingestion of surface water was assessed since, even though swimming is unlikely because of rapidly flowing waters, accidental submersion is possible resulting in incidental surface water ingestion.

Since private drinking water wells exist in the vicinity of the site, exposures to COPCs in off-site private wells were assessed under current land-use conditions. Routes of exposure associated with residential ground water use may include ingestion of drinking water, inhalation of

chemicals that have volatilized from ground water during use (e.g., while showering), and dermal contact with ground water during use (e.g., while bathing). Drinking water ingestion exposures of residents were quantitatively evaluated. Potential exposures from other pathways, such as inhalation or dermal contact during bathing, were not quantitatively evaluated.

To evaluate future exposures, young child/adult park visitors, commercial workers and utility workers were considered as receptor populations. Exposures of park visitors, commercial workers and utility workers to soil/sludge through incidental ingestion of and dermal contact with COPCs were evaluated. Dermal contact with lagoon surface water was evaluated for the park visitor and utility worker scenarios only. In addition, for the utility worker, exposures to volatile COPCs in air during trenching activities were quantitatively evaluated. Exposures of park visitors to river sediment and surface water were also evaluated. Pathways associated with river surface water and sediment exposures that were evaluated include incidental ingestion of and dermal contact with sediment and surface water.

Under a future land-use scenario, it was also assumed that area residents would use ground water from the site for domestic use. As for the current scenario, only drinking water ingestion exposures of future residents were quantitatively evaluated.

The following items summarize the pathways evaluated for each exposure scenario.

Off-site child/adult resident scenario, current
Ingestion pathway: ground water from private wells

On-site adolescent trespasser scenario, current
Ingestion pathways: surface soil/sludge
Dermal contact pathways: surface soil/sludge, surface water

Hoosic River adolescent recreational user scenario, current
Ingestion pathways: surface water, sediment
Dermal contact pathways: surface water, sediment

On-site adult and young child park visitor scenario, future
Ingestion pathways: soil/sludge
Dermal contact pathways: soil/sludge, surface water

Hoosic River adult and young child park user scenario, future
Ingestion pathways: surface water, sediment
Dermal contact pathways: surface water, sediment

On-site commercial worker scenario, future
Ingestion pathways: soil/sludge
Dermal contact pathways: soil/sludge

On-site utility worker scenario, future
Ingestion pathways: soil/sludge

Dermal contact pathways: soil/sludge, surface water
Inhalation pathways: volatiles from soil/sludge and ground water

On-site child/adult resident scenario, future
Ingestion pathway: soil, ground water
Dermal pathway: soil

The risk assessment used the default CT exposure parameters to evaluate average exposures and high-end exposure parameters to calculate RME estimates.

Since no toxicity values are available for lead, lead toxicity was assessed using an interim approach recommended for use with non-residential adult exposures (U.S. EPA, 1996) for the future commercial worker scenario. This method relates soil lead intake to blood lead concentrations in women of childbearing age; this group is assumed to be the most sensitive to lead exposure, among adults. The method does not provide a quantitative estimate of risk; instead it predicts a central estimate of blood lead concentrations in women of child-bearing age that have exposures to soil lead at site concentrations. Risks associated with lead are described by comparing the central estimate of blood lead concentration in women of childbearing age to a goal blood lead concentration associated with a fetal blood lead concentration of 10 µg/dL. For the model, it was assumed that a typical blood lead concentration in women of child-bearing age in the absence of site exposures was 1.7 µg/dL, which is a low end default assumption. The biokinetic slope factor for lead was assumed to be 0.4 µg/dL per µg/day. A representative intake rate of soil was assumed to be 0.05 g/day based on occupational, indoor exposures to dust from outdoor soil (50 mg/day). The absolute gastrointestinal absorption fraction for ingested lead in soil and soil-derived dust was assumed to be 0.12. The exposure frequency was assumed to be 219 days per year. Using these assumptions, the goal for the central estimate of blood lead concentration in adults was calculated as 4.2 µg/dL for the Site. Predicted blood concentrations were compared to this value based on site soil/sludge concentrations.

For the young child park visitor, lead toxicity was assessed using EPA's Integrated Exposure Uptake Biokinetic Model (IEUBK) for Lead in Children (U.S. EPA, 1994). This method relates soil lead intake to blood lead concentrations in young children (i.e., ages 1-6 years); this group is assumed to be the most sensitive to lead exposure, among children. The method does not provide a quantitative estimate of risk; instead it predicts a percent of children with a blood lead concentration above a goal blood lead concentration of 10 µg/dL. The percent of children with a blood lead level exceeding the goal was set at no more than 5%. The exposure frequency was assumed to be 112 days per year. The exposure time was conservatively assumed to be 4 hours per day. Using these assumptions, a soil lead level was calculated which did not exceed the goal of no more than 5% of children with blood lead levels above 10 µg/dL.

Carcinogenic and noncarcinogenic risks were estimated using both the CT and RME exposure assumptions. The significance of the risk estimates are relative to guidelines set forth in EPA policy (i.e., an incremental lifetime cancer risk [ILCR] above the target risk range of 10^{-6} to 10^{-4} and a hazard index [HI] above 1). Risk estimates, as presented in the RI for the RME case, are presented below by area. When risks were estimated for a young child and adult receptor (i.e., residents and park visitors), the young child noncarcinogenic risks (hazard indices) have been

presented as the most conservative, while carcinogenic risks presented represent the sum of the young child and adult risks (i.e., a total receptor risk).

Lagoon Areas: In the five lagoon areas, potential exposures to soil/sludge, surface water and air were evaluated. Health risks from air and surface water are expected to be below or within the EPA risk range of 10^{-6} to 10^{-4} for cancer risk and below a hazard index of 1 for noncancer risk. Health risks from potential future ingestion and dermal contact with soil/sludge at Lagoons 1, 3 and 5 exceed EPA risk guidelines. Soil/sludge contaminants contributing to risks above EPA risk guidelines, under central tendency and RME scenarios were: Lagoon 1 (benzo(a)anthracene, benzo(a)pyrene, pentachlorophenol, dioxins and arsenic); Lagoon 3 (dioxins and arsenic); and Lagoon 5 (benzo(a)pyrene, N-nitroso-di-n-propylamine, dioxins and arsenic). Future childhood exposures to lead in soil may result in excess blood lead levels in park visitors at Lagoon 1.

Warehouse Area: In this area, potential exposures to soil were evaluated. Health risks from surface soil are expected to be below or within the EPA risk range of 10^{-6} to 10^{-4} for cancer risk and below a hazard index of 1 for noncancer risk.

Hoosic River and Associated Wetlands: In this area, potential exposures to surface water and sediment were evaluated. Health risks from surface water are expected to be below or within the EPA risk range of 10^{-6} to 10^{-4} for cancer risk and below a hazard index of 1 for noncancer risk. Health risks from future ingestion and dermal contact with sediment exceed EPA risk guidelines. Sediment contaminants contributing to risks above EPA risk guidelines, under central tendency and RME scenarios were PCBs, dioxins and arsenic.

Off-Site Private Wells: Current exposures via ground water ingestion were evaluated. Health risks from current ingestion of ground water exceed EPA risk guidelines for four of the ten private wells evaluated. Ground water constituents contributing to risks above EPA risk guidelines, under an RME scenario were: RW-003 (arsenic); RW-006 (thallium); RW-008 (arsenic and manganese); RW-010 (manganese).

On-Site Monitoring Wells: Potential future exposures via ground water ingestion were evaluated. Health risks from future ingestion of ground water exceed EPA risk guidelines for 13 of the 24 monitoring wells evaluated. Ground water constituents contributing to risks above EPA risk guidelines, under an RME scenario were: MW-104U (manganese); MW-106U (manganese); MW-107R (dioxin, arsenic and manganese); MW-107U (arsenic and manganese); MW-109U (carbon tetrachloride, heptachlor epoxide, arsenic, manganese and thallium); MW-110R (arsenic and manganese); MW-110U (manganese); MW-111U (manganese); MW-113R (arsenic and manganese); MW-114U (manganese); MW-B-7 (methylene chloride); MW-L-3 (arsenic and manganese); and MW-L-10 (manganese).

E.5.2 Ecological Risk Assessment

The ecological risk assessment for the site was designed to identify COCs for the area's ecological communities and to estimate potential risk to organisms using the area. Study Area habitats include palustrine and riverine wetlands as well as uplands associated with the Hoosic River and adjacent floodplain. Exposure doses were determined for receptors noted or expected

to utilize the aquatic, wetland, and terrestrial habitats present within the Study Area.

Risks to fish, amphibian larvae, and aquatic invertebrates (both benthic and water column communities) were evaluated by concurrently measured surface water and/or sediment concentrations in the aquatic habitats with applicable toxicity reference values. Comparisons were made from samples collected from the Hoosic River, lagoons, landfill ponds, seeps, and Halifax Hollow (landfill stream).

Risks to wildlife receptors including belted kingfisher, mink, Canada goose, muskrat, spotted sandpiper, little brown bat, mallard, raccoon, meadow vole, American woodcock, short-tailed shrew, American robin, and deer mouse were estimated by bioaccumulation modeling and chronic NOAEL and LOAEL toxicity reference values. Wildlife receptors were evaluated with five communities: Hoosic River, lagoons (both aquatic and upland habitats), landfill pond, and landfill wet meadow/seepage areas.

Fish and aquatic invertebrates may potentially be impacted by detected concentrations of iron and manganese within the landfill pond and seeps (invertebrates only). Risks to these receptors are not expected to be elevated above background levels within the Hoosic River, lagoons, and Halifax Hollow communities. Amphibian larvae are note expected to be at an acute risk from COCs present within important amphibian breeding areas (landfill pond and lagoons). Benthic invertebrates may potentially be at risk from detected concentrations of COCs within sediments of the Hoosic River, lagoons, and landfill pond. Primary COCs with sediment include PAHs, pesticides, and several metals including chromium, lead, cadmium, and mercury.

Wildlife receptors potentially at risk (above background risk levels) within the Hoosic River community include the little brown bat from elevated concentrations of high molecular weight PAHs within the sediments. Sediments and surface soils associated with the lagoons provide elevated risk above background risk levels to a variety of wildlife receptors including aquatic mammalian herbivores (musk rat), insectivorous birds (spotted sandpiper and American woodcock), and mammals (little brown bat and short-tailed shrew), as well as omnivorous birds (American robin) and mammals (raccoon and deer mouse). Primary risk drivers within the lagoon sediment and surface soils are dioxin/furans, chromium, cadmium, and lead.

Insectivorous birds (spotted sandpiper) and mammals (little brown bat) may potentially be at risk from concentrations of dioxins, chromium, or Silver detected within the sediments of the landfill pond. No wildlife receptors were within the sediments of the landfill pond. No wildlife receptors were identified at risk above background levels from COCs detected in sediment associated with the wet meadow/seep community present downgradient of the landfill.

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1.0 Introduction

Metcalf & Eddy of Wakefield, Massachusetts (M&E) received Work Assignment (WA) No. 045-RICO-01N9 under the EPA Response Action Contract No. 68-W6-0042 (RAC) to complete a Remedial Investigation/Feasibility Study (RI/FS) at the Pownal Tannery Superfund (Site) in North Pownal, Vermont. M&E assigned the primary responsibility for completing most of the Remedial Investigation to TRC Environmental Corporation of Lowell, Massachusetts (TRC). M&E was responsible for overall project management and completion of the Human Health Risk Assessment, subcontractor procurement, and some field staffing. TRC was responsible for planning and execution of the field program, all data analysis, evaluation and interpretation, the ecological risk assessment, and preparation of this Remedial Investigation Report.

This report presents all of the data collected during the Pownal Tannery Remedial Investigation. This report also presents a scientific interpretation of the facts to provide a basis for further work, including a Feasibility Study to evaluate potential remedial alternatives. All work, unless otherwise specified, was conducted in accordance with the EPA approved Site Management Plan, dated March 2000 and the Field Sampling Plan Addenda, dated August 2000 and November 2000.

1.1 Organization of Report

Section 2 presents a detailed discussion of the investigative activities that were undertaken during the RI. Section 3 provides information about the physical characteristics of the study area, Section 4 discusses the sampling results, and Section 5 describes the fate and transport of the chemicals found at the site.

1.2 Background

The primary focus of this Investigation was to investigate contaminant releases associated with the former Pownal Tanning Company, that operated from 1936 to 1988 in the village of North Pownal, Bennington County, Vermont along the Hoosic River for much of the twentieth century. Based on the operating practices of the tannery and the propensity for such sites to be the source of uncontrolled contaminant releases to the environment, the Vermont Agency of Natural Resources, Department of Environmental Conservation (VTDEC) conducted site inspections and audits while the facility was operational, then commissioned environmental studies of the property after the tannery operations ceased in 1988. Based on these inspections, audits and studies, plus subsequent studies conducted by the United States Environmental Protection Agency (EPA) the State and the Federal Government determined that contaminant releases had occurred and that the site warranted inclusion on the National Priorities List.

The study area for this Remedial Investigation encompasses all of the properties that are known or suspected to have been associated with contaminant releases from industrial activities at the former Pownal Tannery. The area includes both developed and undeveloped land, forests, wetlands, structures and historic sites, and the area is surrounded by residential, small business and agricultural properties. Additional details regarding the site, including previous environmental work and historic chronologies are discussed in the following sections.

1.2.1 Site Description

Figure 1.2-1 shows the location of the Pownal Tannery site in the Village of North Pownal, Vermont, approximately 20 miles southwest of the City of Bennington, Vermont at 42° 47' 49.8" north latitude and 73° 15' 56.7" west longitude.

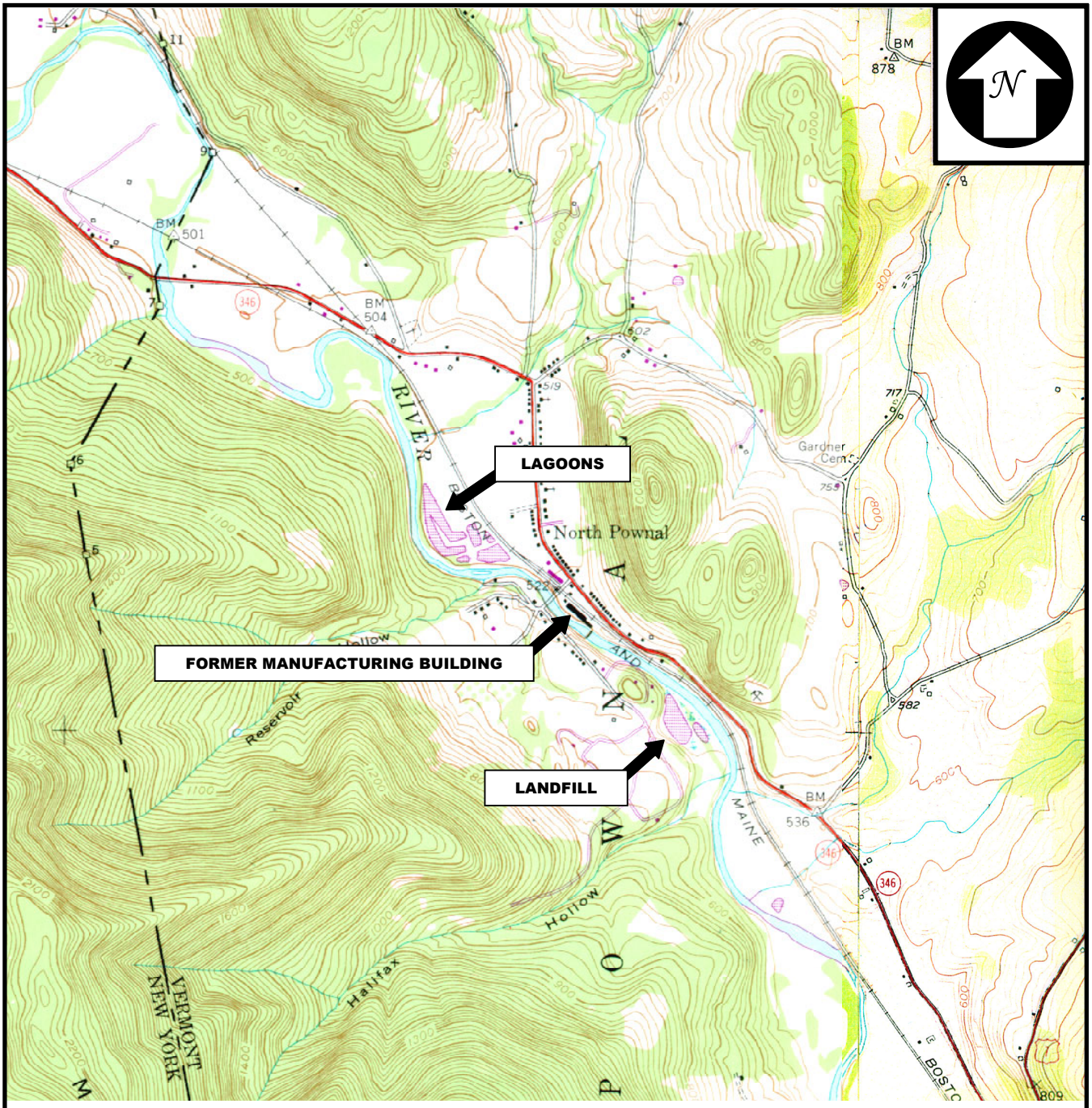
Figure 1.2-2 presents a map showing the site boundary and the areas of concern. The areas of concern include the Lagoon Area, the Woods Road Disposal Area, the Warehouse Area, the Former Tannery Building Area, the Landfill Area and the Hoosic River. The Site consists of four properties, all of which are owned by John Flynn and Sons. The larger, northern property is elongate and occupies approximately 30 acres. This larger parcel encompasses the Former Tannery Building Area and the Lagoon Area. This property extends south of the hydroelectric dam several hundred feet, is bordered to the east by the Boston and Maine railroad tracks, and is bounded to the west by the Hoosic River. The property extends north a short distance beyond the lagoons and is bordered to the north and east by farmland.

The Lagoon Area consists of four open depressions, remnants of the five tannery lagoons. The area is undeveloped and overgrown with vegetation. Portions of Lagoons 1, 2 and 4 have ponded water and Lagoons 5 is filled with water. A gravel road leads into the site with three locked gates and fences around some of the lagoons. The berms around each lagoon serve as trails or roads allowing access around most of the lagoons. One of the lagoons is filled in and covered with gravel, forming a broad unpaved flat area in the central portion of the lagoons.

The Former Tannery Building Area is covered with a combination of grass, pavement and crushed stone. The area slopes westward down to the river and contains guard railings and remnants of the former tannery building foundation. In the southern portion of the parcel, a small building exists adjacent to the river to shelter the former hydroelectric works that is no longer operational.

Two smaller properties are located to the east and west of the larger property separated, respectively, by the Hoosic River and the railroad tracks. The small western property containing the Woods Road Disposal Area is located on the west bank of the Hoosic River bordered to the west by Woods Road. A pump house and two original Tannery water supply wells are located here, but neither is functional. This property slopes gradually to the river and is overgrown with a layer of riprap placed along the river edge.

The other small property containing the Warehouse Area is located east of the railroad tracks and is bounded to the west by State Route 346. Reportedly, hides were stored in this warehouse and on tables outside of the warehouse. A portion of this property is paved and is used for parking and for truck loading and unloading at the warehouse.



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' USGS TOPOGRAPHIC QUADRANGLES: POWNAL, VT, 1954; NORTH POWNAL, VT-NY, 1954, PHOTOREVISED 1980

0 1000 2000 3000

approximate scale in feet

Figure 1.2-1

SITE LOCATION MAP

REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
POWNAL TANNERY
POWNAL, VERMONT

Metcalf & Eddy

TRC

Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

QUADRANGLE LOCATION

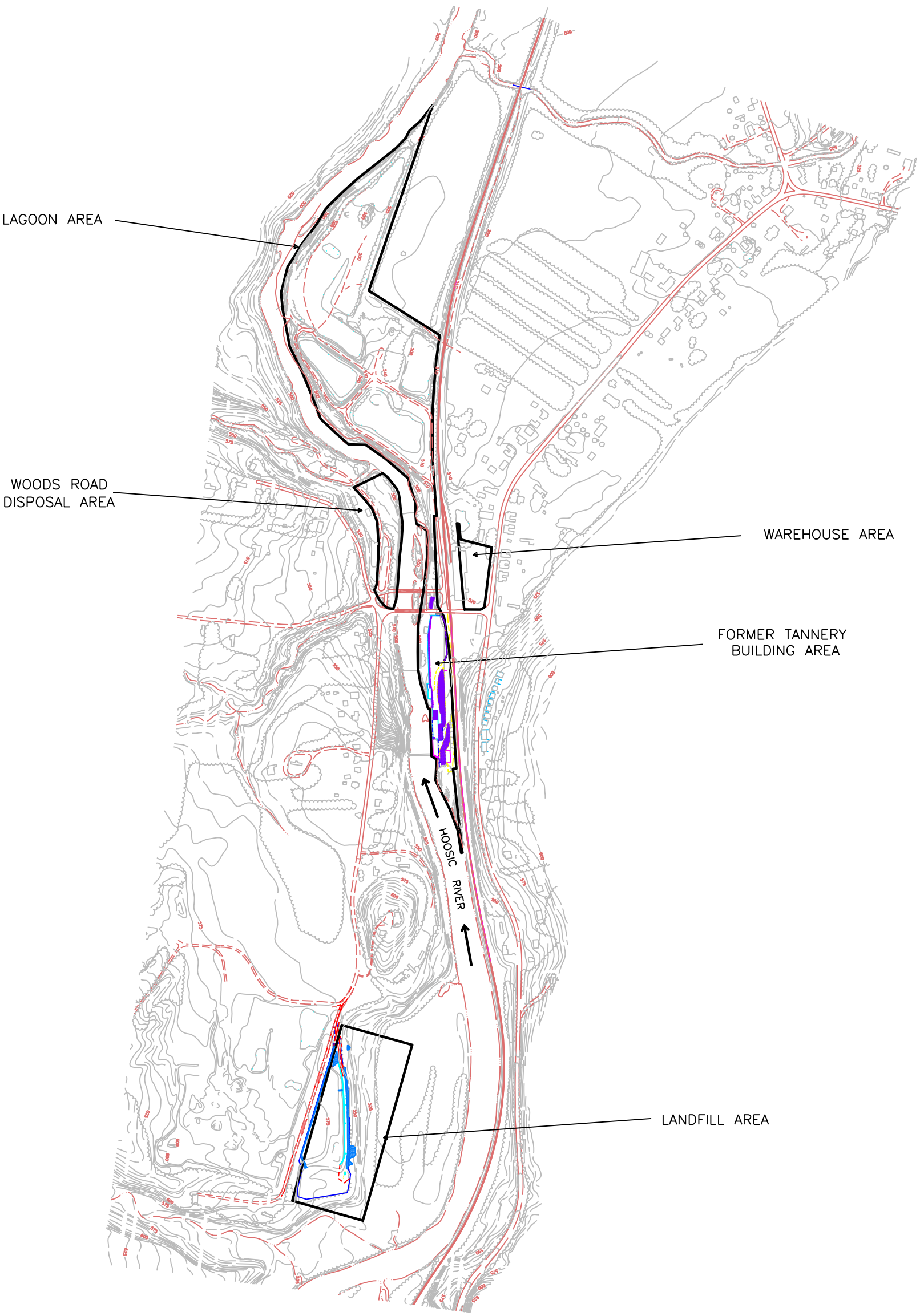
VT

TRC PROJ. NO.: 02136-0380-01N91

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACTOR NO.: 107061

01236/RI/SITE LOC2



0 200 400 600 800 1000

SCALE IN FEET

LEGEND

TANNERY PROPERTY BOUNDARY

TRC
Boott Mills South
Foot of John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 02136-0220-01N93

EPA CONTRACT NO.: 68-W6-0042

RAC SUBCONTRACTOR NO.: 107061

FIGURE 1.2-2
STUDY
AREA
POWNAL TANNERY
POWNAL, VERMONT

M&E Metcalf & Eddy

The fourth and southernmost property contains the landfill that was used by the tannery to receive sludge from the clarifier and lagoons. This southern property is rectangular and includes some wetlands and a portion of a pond located downhill (east) of the landfill. The pond and wetland extend further east to the Hoosic River. Residential properties border the landfill property to the north and south, and Dean Road forms the western property boundary. A gravel pit is located across Dean Road to the west.

1.2.2 Demography

North Pownal is part of the town of Pownal, Vermont, incorporated in 1767. The current population of North Pownal is approximately 3,530.

1.2.3 Land Use

All of the properties are situated within two town zoning districts: the "Village Residential" district and the "Rural Residential" district. The purpose of both the Village Residential and Rural Residential districts is to preserve the natural rural and scenic qualities of the Town, allowing residential and agricultural uses of property as well as some non-residential uses. Non-residential uses are permitted as long as they do not create certain nuisance conditions (noise, dust, vibration, glare, heat, odor or smoke). Allowable uses include, but are not limited to, multiple family dwellings, recreation, construction or contracting businesses, manufacturing, research, auto repair and animal boarding. Any non-residential or non-agricultural use is subject to the conditions that are specified in the Town Zoning Bylaws (April 1, 1991, amended February 23, 1995).

There are several residences that border the property occupied by the Pownal Tannery and there are a few commercial businesses that abut the property. The nearest residence is approximately 75 feet from the Site and a retail store is located approximately 40 feet from the Site boundary. Within a mile radius from the Site, approximately 275 people are served by private drinking water wells completed in either the overburden or bedrock.

Currently, the on-site warehouse is operated privately and is vacant. The park located on the site of the former Tannery building is open for use by the community. Access to the lagoons on the site is posted, prohibited, gated and fenced. There is a locked gated fence surrounding the landfill on the southern property, but there is no site control for the property area outside of the landfill.

A portion of the site is listed on the Vermont Register of Historic Places (SR No. 0208-8), as is the adjacent General Store and the steel truss bridge that spans the Hoosic River (now closed). The area encompassing the former tannery building, the General Store (located adjacent to the tannery property) and 16 off-site residences (located on the eastern side of State Route 346) is designated as the North Pownal Mill Historic District.

1.2.4 Operational History

The Pownal Tannery site has an industrial history that began over 200 years ago. A summary of key, relevant operational history is presented below.

- 1780: A grist mill is constructed by Richard Brown at the site.
- 1813: Richard Brown's son, Ethan Brown converted the grist mill into a wool weaving and carding plant.
- 1840: The wool weaving and carding plant is destroyed by fire.
- 1849: A woolen mill is constructed.
- 1856: The Troy and Greenfield Railroad is constructed along the Hoosic River and the site. Note that the original railroad bed crossed the Hoosic River near the Lagoon Area and originally ran on the western side of the Hoosic River through the Woods Road Disposal Area and east of the Landfill Area.
- 1863: The woolen mill is destroyed by fire.
- 1866: The Plunket and Barber Company constructed a multistory, brick, cotton textile mill on the site.
- 1876: The mill is purchased and operated by A.C. Houghton Company.
- 1915: A train freight station (located on the western bank of the Hoosic River) is demolished by a train wreck.
- 1920 (approximate): A second set of railroad tracks is constructed along the eastern side of the Hoosic River and the tracks on the western side are abandoned.
- 1931: The cotton mill ceases operation.
- 1936: The mill is refurbished by the Pownal Tanning Company and opens as a cow and sheep hide tanning operation. The operation consists of hide cleaning (beaming) using a variety of chemicals (pesticides, solvents), hydrochemical stabilization of the purified leather (tanning) using trivalent chromium, dyeing and lubrication of the tanned leather, followed by pasting and finishing of the leather into a variety of textures and thicknesses for commercial sale.
- 1939: A steel truss bridge is erected across the Hoosic River north of the former tannery building.
- 1940: The mill building is expanded.

- 1955: A hydroelectric dam is constructed across the Hoosic River to power the adjacent former tannery building and associated hydroelectric machinery is installed at the site.

- 1962: A lagoon system (two unlined lagoons) and a screen house are constructed to precipitate solids out of the waste water prior to discharge to the Hoosic River. One of the byproducts of the hydrochemical stabilization was a stream of waste water containing high concentrations of metals that was pumped several hundred feet to the north into these lagoons constructed next to the Hoosic River. Waste water was collected in the lagoons and screened to collect solids, then the water was pumped into the Hoosic River.

- 1965: Further expansion of the mill building occurs.

- 1971: Three lagoons added to system. The five lagoons occupy 22 acres.

- 1978: A clarifier building is constructed to clarify and flocculate sludge. An estimated 250,000 to 300,000 gallons per day of wastewater are discharged to the lagoons and solids from the clarifier were disposed of in Lagoons 1 and 2.

- 1980: Lagoons 1, 3A, 3B, and a portion of Lagoon 4 are filled with settled sludge.

- 1983: Lagoon 1 is covered with a 1 foot layer of silt.

- 1988: The tannery closes and files for Chapter 11 bankruptcy.

1.2.5 Regulatory History

The earliest regulatory history related to the site concerned site operations and complaints from residents about odors and other issues. Later milestones are associated with state and federal involvement and eventual listing as a Superfund Site. A summary is provided below.

- 12/30/81: Pownal Tannery applied for permit to construct and operate a lined landfill to hold dewatered sludge.

- 1/21/82: The Vermont Agency of Natural Resources determined that the sludge in the lagoons should not be regulated as hazardous waste.

- 6/9/82: A disposal Facility Certification was issued to permit construction and operation of a lined landfill to receive sludge from lagoons. The landfill is to be comprised of three lined cells into which sludge is deposited, via truck, from the tannery lagoons approximately twice a week. A leachate tank is also installed to collect leachate from the landfill, and as the tank fills, the leachate is removed and disposed at a nearby waste water treatment works (Surwillo, 1991). The landfill is to be operated under a specific set of conditions, including daily cover with six inches of soil, drainage of the leachate tank and disposal into the Pownal Tanning Company wastewater treatment plant, semi-annual sampling of six ground water monitoring wells: two locations in Halifax Brook, and at six nearby residential drinking water wells.

- 1985: The Vermont Agency of Natural Resources issued a letter to the Pownal Tannery alleging deficiencies and maintenance problems at the site.

- 1987: Two-thirds of the Landfill is closed and covered by the Pownal Tanning Company.

- 4/6/88: Vermont Agency of Environmental Conservation issued an Administrative Order to Pownal Tannery. The order requires Pownal Tannery to take additional precautions to control odors, accelerate excavation of sludge from Lagoon No. 2, present a cleanup plan for Lagoons 4 and 5, testing of ground water monitoring wells and completion of a risk assessment

- 1995: The Hazard Ranking System Package is completed by TRC for EPA.

- 9/29/98: The Site is proposed for the National Priorities List (NPL) on September 29, 1998.

- 1/11/99: The Site is added to National Priorities List.

- 8/99: The Town of Pownal is awarded a Superfund Redevelopment Initiative Grant from EPA to study reuse options for the site after remediation is completed.

- 2/01: The Town completed their reuse study. After a thorough review of citizen and Town needs and developed a reuse plan for the Former Tannery Building Area, the Warehouse Area and the Lagoon Area. The reuse plan includes construction of a sewage treatment plant, a skating rink, recreational open areas and nature trails through the Lagoon Area.

1.2.6 Previous Investigations

Numerous environmental investigations and interim remedial actions have been conducted at the Site since the 1960's. A summary of the work conducted and findings (where available) from previous investigations is presented below. Note that many of the previous testing programs included samples collected from locations that were not well documented and most of the previous data were not validated. Therefore, the data from previous investigations were used where possible to plan the sampling approach for the Remedial Investigation, and previous data were used in interpreting geological and hydrogeological site conditions, but the previous data were not used to support the risk assessments.

- 1980-1988: A limited ground water monitoring well network (16 wells) was installed around the lagoons and landfill, and samples were periodically collected and analyzed by the Pownal Tannery. During this period miscellaneous sampling and analysis of residential wells was performed, lagoon sludge testing was conducted (EP Toxicity) and a preliminary magnetometer survey was completed.

- 8/20/86: VTDEC issues order for the Pownal Tannery to conduct a limited hydrogeological assessment. Also during this period miscellaneous sampling and analysis of residential wells and lagoon sludge was conducted (including EP Toxicity testing), and a preliminary

magnetometer survey was conducted and documented in a subsurface hazardous waste investigation report prepared by the tannery.

- 11/18/88: Four residential wells (Lubeck, Casey, Powell, and Tudor residences) and two lagoon area wells (L-7 and L-8) are sampled by Aquatec, Incorporated for dioxin and VOCs. No dioxins are detected, and two VOCs (chloroform, chlorobenzene) are detected in the Casey, Tudor and Powell wells at low concentrations (< 2 ppb) (Aquatec, 1988).

- 1/11/93: TRC completes a Site Inspection Prioritization (SIP) at the Site for EPA. Compressed gas cylinders, drums of chemical wastes, tanks and vessels of process wastes, friable asbestos, and sludges in the facility wastewater treatment system were found at the Site.

- 3/15/93: An Action Memorandum was signed to initiate a Time Critical Removal Action (TCRA), which commenced on April 12, 1993. The TCRA consisted of removal of hazardous substances from the site including compressed gas cylinders, asbestos containing materials, tank contents, three 1-gallon cans of tetrahydrofuran, suspected dioxin-containing wastes, and one drum containing pentachlorophenol. In addition, all tanks were cleaned and wastes sent off-site, covers were welded onto five open topped in-ground tanks located in the lagoon area, sludge in floor drains and smoke stack debris were sampled, all buildings were sealed to prevent public access and potential exposure, waste piles were sampled and all hazardous contents were disposed off-site and a breach in Lagoon 4 was repaired. On-site activities were completed on May 18, 1994.

- 5/93 and 9/93: Ground water testing in the Lagoon Area indicates low concentrations (<30 ppb) of Chromium and low concentrations of VOCs, including acetone (410 ppb), chlorobenzene (<22 ppb) and 1,2-dichlorobenzene (<10 ppb).

- 10/95: Laboratory testing of soil samples from borings advanced to examine subsurface conditions for placement of a temporary bridge across the Hoosic River indicate elevated levels of polyaromatic hydrocarbon (total maximum concentration of all polyaromatic hydrocarbons = 57,400 ppb) and methyl naphthalenes (total maximum concentration 6,600 ppb).

- 2/97: Metcalf & Eddy submitted a report on an Ecological Investigation that included the review of off-site mapping to identify the presence of wetlands, flood plains and other natural features of the Site, as well as an on-site ecological survey, which provided a limited assessment of the plant and animal species inhabiting the Site. Also, during the summer of 1995, M&E conducted a limited investigation of the clarifier building, landfill, and lagoons, collecting soil, river sediments, leachate, ground water and surface water samples (i.e., in the Hoosic River and lagoons).

- 3/97: Roy F. Weston conducted an additional investigation for EPA to further characterize the tannery building and screen house building. This investigation included sampling and analysis of wood, concrete, soil sludge, debris, and standing water within the buildings.

- 3/97: Metcalf & Eddy conducted a Superfund Accelerated Cleanup Model (SACM) field investigation at the Site for EPA. This investigation included sampling and analysis of wood, concrete, soil sludge, debris, and standing water within the buildings.

- 7/97: Weston conducted an investigation for EPA to further characterize the nature and extent of contamination within the tannery buildings.

- 6/98: The Agency for Toxic Substances and Disease Registry conducted a Health Consultation for EPA.

- 11/98: EPA completes an Engineering Evaluation/Cost Analysis (EE/CA) to assess various options for controlling and containing the source of contamination at the Site.

- 3/22/99: Action Memorandum for a Non Time Critical Removal Action is signed. The Scope of Work includes decontamination and demolition of the former tannery buildings, excavation of soils and sludges above specified cleanup levels within the tannery building footprint, and construction of a RCRA Subtitle C cover of the on-site landfill. This work is currently underway and will be completed in 2001.

- 6/00: The Agency for Toxic Substances and Disease Registry conducted a Health Consultation for EPA.

- 1/01: Remedial Investigation of the site begins.

1.2.7 Status of Remedial Actions

In 2001, EPA completed a Non Time Critical Removal Action at the site. A summary of the activities performed is presented below.

Landfill Area: The landfill was regraded and covered with a multi-layer, RCRA Subtitle C cap.

Former Tannery Building: The tannery building was decontaminated and demolished and an underground storage tank was removed. Underground manways and piping was abandoned or removed. Soil from within the building footprint was excavated and disposed in the landfill prior to closure.

Warehouse Area: An underground storage tank located south of the warehouse was removed. Floor drains and scale pits inside the building were cleaned of sludge, and the sludge was disposed off-site. Several overpacked drums stored in the warehouse were removed and disposed off-site.

Woods Road Disposal Area: Approximately 2,500 cubic yards of contaminated fill containing soil, building demolition debris, leather scraps, piping, wire, and other debris was excavated and disposed off-site. The area was regraded and the slope along the river edge was reinforced with rock.

Lagoon Area: The clarifier and press buildings were demolished and removed along with some underground piping.

1.3 Organization of Report

The organization of this report essentially follows the outlined that is suggested in the United States Environmental protection Agency's "Guidance or Conducting Remedial Investigation and Feasibility Studies under CERCLA (EPA, 1988). The first two sections present background information about the study area and describe the investigations that were conducted. Section 3.0 presents the physical characteristics of the study area. Section 4.0 discusses the nature and extent of contamination of the site and study area. Section 5.0 presents a discussion of the fate and transport of site contamination, including potential migration pathways. Section 6.0 presents a site conceptual model for contamination.